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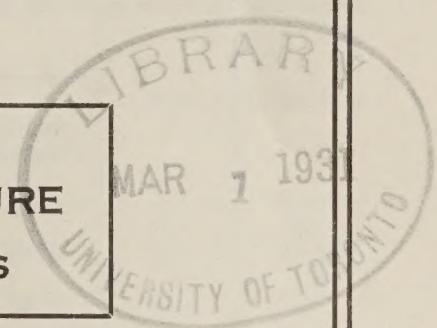
Canada Agric. Dept.

THE GREATER USE OF BARLEY IN LIVE STOCK FEEDING

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BARLEY should be regarded as practically the equal of corn with all classes of live stock in the feeding of which the latter grain has played an important part. It is a Canadian Product admirably suited to widespread production under Canadian conditions, climatic and cultural. It is equally well qualified for a place in the growing and finishing rations of Canadian live stock.

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ANIMAL HUSBANDRY DIVISION
DOMINION EXPERIMENTAL FARMS

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THE GREATER USE OF BARLEY IN LIVE STOCK FEEDING

Barley is probably one of the most widely cultivated of the cereals, being found in extreme northern as well as southern latitudes. It was the main source of flour for the bread of many of the ancient nations, but latterly it has been used largely for the manufacture of malt and pearl barley, and for live stock feeding. In so far as the North American continent is concerned, the advent of prohibition of alcoholic liquors in the United States, and of restricted production and sale (Government control) of them in Canada, has quite materially reduced the use of barley for malting purposes. There is still a market in Canada, however, for limited quantities of a good quality of barley for malting purposes, usually at a premium over ruling market prices. The fact that there is this limited market for malting barley has stimulated barley production generally, which, in turn, has undoubtedly made more low grade feeding barley available. The pearl barley industry does not loom very large as an outlet for our Canadian barley. This leaves live stock feeding as the main outlet for Canadian grown barley. In this connection it may be emphasized that barley is relatively considerably cheaper than corn, and when it is considered that barley is a Canadian grown product, while corn is quite largely an imported product, it is quite apparent that both from an economical and national point of view, it would seem wise for the Canadian feeder to make a greater use of barley.

The present situation as regards barley is that in the crop years of 1928 and 1929 there were large crops of this cereal in the West and also in the East, making barley one of the cheapest coarse grains on both the western and eastern grain markets. It is felt, therefore, that the following discussion of the value of barley for feeding to various classes of stock may be found timely.

COMPARATIVE ANALYSES OF COARSE GRAINS

	Water	Ash	Carbohydrates			Fat	T. D. N.*
			Crude Protein	Fibre	N-free Extract		
Barley	9.3	2.7	11.5	4.6	69.8	2.1	79.4
Corn.....	10.5	1.5	10.1	2.0	70.9	5.0	85.7
Oats	9.2	3.5	12.4	10.9	59.6	4.4	70.4
Wheat.....	10.2	1.9	12.4	2.2	71.2	2.1	80.1

*Total digestible nutrients per 100 pounds.

The foregoing comparative analyses of the more common coarse grains grown on Canadian farms go to show that barley compares favourably with the best of them, being well up to the average in protein, low in fibre for a grain carrying a hull, and relatively high in carbohydrates and fat, all of which are readily digestible, so that in total digestible nutrients it is excelled only by corn and wheat. The former gets its higher value through carrying more fat and having a slightly higher digestibility, while wheat contains slightly more starch and has no hull, therefore having a slightly higher digestibility.

Barley as a Feed for Beef Cattle

Ground or crushed barley makes an exceptionally good grain for both growing and fattening cattle. Being largely of a carbohydrate or fattening nature, it serves to hold the natural calf fat on the young animal, and to increase the deposition of fat on the mature animal. In 1926 at the Lennoxville Experimental Station one lot of steers was fed barley as the sole grain. These steers made slightly greater gains on a lower meal consumption, with a lower feed cost per pound gain than a similar lot of steers fed a meal mixture. Incidentally, the barley realized \$2.17 per hundred pounds when disposed of in this way, which was seventy-seven cents more per hundred pounds than the ruling market price. In addition, considerable fertility was returned to the soil.

At the Scott, Saskatchewan, Experimental Station in 1929, steers fed straw and a meal mixture of three parts oat chop, and one part barley chop made greater gains, on less grain, at less cost, than similar steers fed frozen wheat in place of the barley. It is worthy of note, however, that another group of steers on the barley ration plus sweet clover hay made twenty per cent greater gains at thirteen per cent less cost, thus showing the value of protein balance in the ration.

While barley may be fed as the sole grain, better results will be obtained where it is fed in a mixture. For finishing cattle, up to sixty-six per cent or even seventy-five per cent may be used, provided a well balanced roughage ration is being fed. For younger cattle and preliminary feeding of older cattle, forty per cent to fifty per cent of barley in the ration would be found more economical. Boiled or steamed barley is a favourite feed for beef cattle feeders, and for show men, where it is desired to get the highest possible finish on an animal or group, previous to the sale or show.

Barley as a Feed for Dairy Cattle

Barley has not been very generally used as a feed for dairy cattle in the past, and if advocated now, one immediately hears the protest that barley is not suitable for dairy cattle. The fact remains, however, that there is nothing in its composition that precludes the use of barley for this class of stock. In any dairy meal ration it is well to have some ingredient that will serve to maintain and even build up the body of the animal, otherwise, much flesh is lost to the ultimate detriment of the animal's milk producing ability. Barley fills this want admirably, as is readily realized by the Danes who regard ground barley and oats as a very good concentrate for dairy cows. When using barley, however, care must be taken to balance the carbohydrates and fat of the barley with protein from other sources. In districts where legume hays, more particularly alfalfa, can be grown, these should be made to supply the additional protein. Where legume hays cannot be grown to advantage, oilcake meal, cotton-seed meal, gluten feed, etc., should be used to balance the ration. Generally speaking, barley should not form more than twenty-five per cent to thirty-three per cent of the grain ration for dairy cows. However, in alfalfa growing districts, the grain ration for dairy cows can be composed almost entirely of home grown oats and barley, and since barley is the heaviest yielding crop it might very well form the bulk of the grain crop in such districts.

Barley as a Feed for Horses

In the past barley has not been utilized to any great extent in the feeding of horses in Canada. One reason explaining this fact is that barley, unless grown by the feeder himself, has been relatively high priced and even difficult to obtain in many cases. This condition has been radically changed within

the last year. Another reason is the general impression that barley is a dangerous grain for horses, in that its use is frequently conducive to a scurfy condition of the skin and to itching, scurfy legs,—“too heating”, the horseman says. Possibly a third reason is the comparative lack of palatability of barley compared with oats.

Admitting that barley, as a logical result of its composition, is a grain most economically marketed on the farm through fattening or meat producing animals, such as market hogs or beef cattle, and that oats is well and long proven as the standard grain for horses—barley utilized in right quantities is well worth considering.

While, for the reasons given, little actual experimental evidence has been accumulated on Dominion Experimental Farms concerning the value of barley as a horse food, its economical use is well recognized as appearing in grain mixtures up to twenty-five per cent or more. It will give best results with horses at work or in the winter ration of growing colts and the inclusion of a small proportion of bran in the grain mixture, or of a feed of alfalfa hay or alfalfa and timothy mixed, will tend to prevent any of the undesirable results attributed to this grain.

Barley, well boiled, with the unabsorbed liquid taken up with bran, with the addition of a cupful or so of molasses and a pinch of common salt, or a tablespoonful of Glauber's salts, forms one of the very best conditioning feeds for a horse, fed two or three times weekly, or even each night over a period.

The advantages of bruised or rolled whole oats are well recognized and this process is particularly desirable where barley is included in the grain mixture, owing to the flinty nature of this grain.

It is of interest to note that barley is extensively used as a horse feed in other countries, notably in Africa, certain countries of the Orient, and in Europe. In the United States it is quite extensively used, particularly on the Pacific coast. In most cases, it is fed pure, and concerning its value thus used, it has been shown with working horses to be from slightly less than up to ten per cent greater than that of oats.

Finally, the important point is that barley, instead of being sedulously avoided, may be economically used in horse feeding, provided it is available or the price permits, that discretion is used in quantities fed, methods of preparation, etc., and in properly balancing the ration elsewhere. It is not in any sense a competitor of oats, which is, after all, the ideal grain for the horse, and although not generally popular, barley is utilized satisfactorily by many farmers and horsemen to-day.

Barley in Swine Feeding

Barley is very popular as a hog feed in this country, and is capable of producing high class bacon. It is the opinion of many experienced feeders that when mixed with other feeds, it is at least equal if not superior to corn. Barley has been used for the feeding of bacon hogs in European countries for a long time, and is considered to be the ideal feed for the finishing and fattening of this type of hogs, it being capable of producing pork of the finest quality in flavour, texture and firmness of flesh.

BARLEY FEEDING IN MIXTURES.—At the Napan Experimental Farm, experiments were carried out during 1924 in the feeding of corn versus barley to growing and fattening hogs. The pigs were fed under both inside and outside conditions, and were given an addition of green feed to their rations. The barley fed lots averaged slightly higher in daily gains and would thus be ready for market somewhat sooner. The barley lots gained 1.22 pounds per pig per day, while the corn lots gained 1.16 pounds per pig daily. The barley and corn were evaluated in the meal mixtures at the same cost, and in the cost of feed

per hundred pounds gain the barley lots showed a slightly lower cost. The barley lots cost \$7.67 per cwt. gain, while the corn lots cost \$7.78 per cwt. gain. The above differences in both daily gains and costs per cwt. gain were almost negligible. However, it shows that barley and corn have practically the same feeding value when used in meal mixtures for growing and fattening swine. In another experiment carried out at the Nappan Experimental Farm on corn versus barley for hogs, it was found that the barley lot was much superior in bacon type to the corn fed lot. This is a rather common observation in the feeding of barley and along with the bacon type carcass, there is generally a firmer fat in the barley fed hogs.

BARLEY AS A SINGLE GRAIN.—Experiments at the Ohio Experiment Station during 1923 with pigs proved that with corn worth \$2 per cwt., barley has a feeding value of \$1.83 per cwt., and oats a value of \$1.41 per cwt. This experiment was evidently undertaken with the single grains, and so it is likely that fed in this way, barley would not have such a high feeding value as if it were fed as only a part of the ration. Its value has always seemed greater when fed in combination with other feeds. Thus in the feeding of barley, it would seem advisable to use it combined in meal mixtures, composed of such feeds as ground oats, middlings, shorts, and wheat, with the addition of a small percentage of either ground flax or oil cake meal, and either digester tankage or one of the milk by-products. Barley is also slightly less palatable than corn, oats or wheat, and for this reason as well as for its feeding value, it is preferable to feed it in combination with other feeds.

COMPOSITION.—Like corn, barley is carbonaceous in character and is somewhat higher than the former in both carbohydrates and crude protein. Compared to oats, barley is superior for finishing hogs due to its high carbohydrate content. However, it is lower than oats in protein, fibre, fat, and ash. As a feed for young pigs or for sows suckling pigs, barley is less desirable than oats, being fattening in nature and tending to cause digestive disturbances. The composition of barley varies to some extent, depending on the variety and the climatic conditions under which it is grown, but Canadian barley generally speaking is comparatively uniform in composition.

PREPARATION FOR FEEDING.—If it is impossible to grind the barley for feeding to hogs, soaking for twenty-four hours or longer will improve its digestibility as well as its palatability. Even when fed ground, soaking of the grain from one feeding to another is of value by way of increasing palatability. When the only preparation given is that of grinding, fineness is essential, and unless in such condition, much of the advantage of the operation is lost. Fine grinding also assists in destroying any weed seeds, which might be present in the grain.

RATIONS.—The following rations are suitable for growing and fattening pigs, and as will be noted, include a considerable proportion of barley. Where barley is not available at the right price, wheat or corn may replace it with practically the same results. Skim-milk or buttermilk, when available in sufficient quantity, may be used to entirely replace the tankage, and linseed oil meal recommended in the following rations:—

<i>Growing Pig Ration</i>		<i>Fattening Ration</i>	
Ground barley	25 %	Ground barley	50 %
Middlings	15 %	Shorts	15 %
Shorts	15 %	Ground oats	30 %
Ground oats	35 %	Tankage	3 %
Tankage	4 %	Bone meal	1½ %
Linseed oil meal	4 %	Salt	½ %
Bone meal	1½ %	Milk	
Salt	½ %	Green feed	
Milk			
Green feed or pasture			

Barley in Sheep Feeding

While in the past, barley has not been commonly fed to sheep, there is no reason why it should not be used in greater quantities. Being a farm-grown grain, its substitution for corn should be a profitable procedure in the fattening of lambs.

Feeding trials in United States give barley a value almost equal to corn for the finishing of lambs. At the La Ferme Experimental Station, Quebec, barley was found as valuable as corn when both grains were compared, appearing in each case as one part of a mixture of ground oats, 2 parts, bran, 2 parts, and oil meal, 1 part. The lambs made very good gains, and finished satisfactorily. When fed alone, barley has also given very satisfactory results.

At the Lacombe Experimental Station, Alberta, whole barley made a good showing, but stood second as compared to oats. However, a report from the Lethbridge Experimental Station, Alberta, indicates that with alfalfa, a mixture of equal parts barley and oats has resulted in excellent gains and better finished lambs at the end of the trial. The addition of silage resulted in a slight increase in the daily gains. It must not be forgotten that barley is carbonaceous and consequently a fattening feed.

Best results will be obtained when fed in combination with a good legume hay. Equal parts of oats and barley, or 2 parts of oats and 1 part of barley are very good mixtures to feed in this connection.

With non-leguminous roughages, such as mixed hay, low land hay, etc., bran or linseed oil meal should be added to balance the ration. A mixture of 2 parts oats, 2 parts barley, and 1 part bran or $\frac{1}{2}$ part oil meal constitute a good concentrate.

In the feeding of barley, care must be taken that the grain be not too finely ground. Sheep prefer their feed sufficiently coarse that it may be masticated and finely ground. Barley is objectionable to them as it is apt to form a sticky mass in the mouth. Therefore, it is recommended that barley be fed whole, rolled, cracked or coarsely ground. In such form it is eaten more readily, aside from the fact that grinding costs are reduced.

Summary

1. Barley is a Canadian grown product relatively cheaper than imported corn.
2. It is now readily available at comparatively low prices.
3. In total digestible nutrients, it is excelled only by wheat and corn.
4. Barley lacks slightly in palatability as compared with corn and is best fed in conjunction with other grains.
5. Being of a carbonaceous or fattening nature, it may be most advantageously used with meat producing animals in both the growing and fattening stages.
6. It is generally recognized as the most useful Canadian grown grain for swine feeding.
7. It is almost equally useful in the feeding and finishing of beef cattle.
8. With oats, it forms a good base for dairy cattle grain mixtures where the additional protein required to balance the ration is otherwise supplied, for example, by alfalfa or high protein cereal-legume hay crops.
9. Barley may be safely and economically fed to work horses as a part of the grain ration. It is best rolled or bruised.
10. Barley, rolled, cracked or coarsely ground, combines well with oats in the fattening of lambs.

